

Taxonomic Study on Marine Sponges from Gageodo Island (Sohuksando), Korea

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ABSTRACT

A taxonomic study of the marine sponges was conducted with the materials collected from Gageodo Island (Sohuksando), Korea from August 1999 to July 2001. The sponges were identified into 35 species, 23 genera, 16 families, six orders, two subclasses and a class. Among them, two of *Polymastia murrayi* Burton, 1959 and *Clathria (Thalysias) spicata* Gray, 1924, are newly recorded to Korean fauna, and *Stylocordyla koreana* n. sp. is new to science.

Key words: Taxonomy, marine sponge, Gageodo Island, Korea

INTRODUCTION

Gageodo Island (Sohuksando, 125° 08'E, 34° 03'N) is located at the west-southern waters, where it is 160 km away from Mokpo, Korea. Only four species have been reported from Gageodo Island (Sim and Lee 2001a, b, 2002) so far, because it is difficult to collect the sponges from Gageodo Island where shows the low visibility in the subtidal zone through the year. The materials examined in the present study were collected from Gageodo Island and its adjacent waters by SCUBA diving from August 1999 to July 2001 (Fig. 1). As a result, 35 species, 23 genera, 16 families, six orders, two subclasses and a class were found from Gageodo Island. Of which, two species of *Polymastia murrayi* Burton, 1959 and *Clathria (Thalysias) spicata* Gray, 1924, are newly recorded to the Korean fauna, and *Stylocordyla koreana* n. sp. is new to science.

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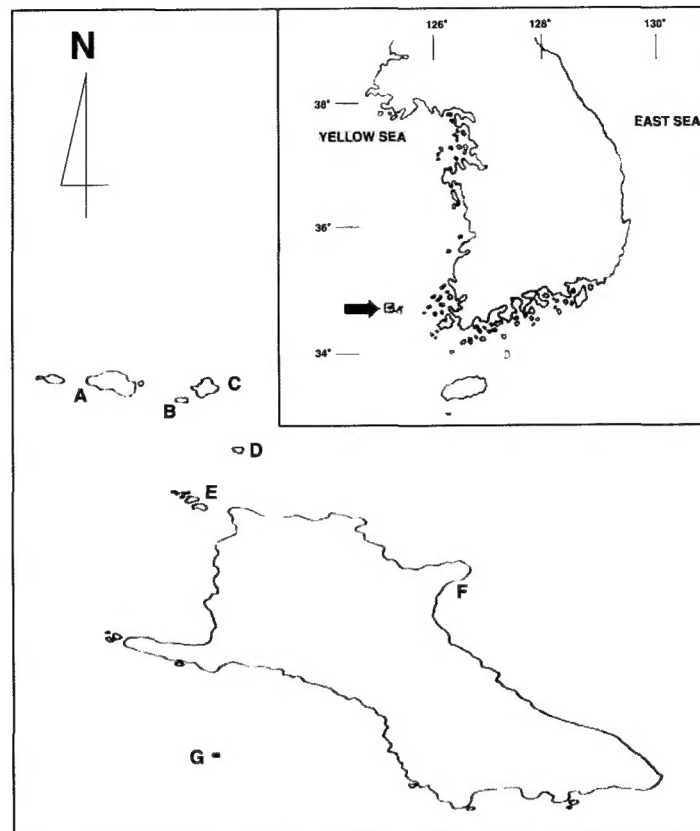


Fig. 1. A map showing the collecting sites of sponges in Gageodo Island. A, Kukhuldo; B, Sinyeo; C, Kaerin-yeo; D, Tuogyeo; E, Kommunyeo; F, Ponjianmal; G, Sokanyeo.

The identification was made on the basis of the external features, shape, structure of skeleton and size of spicules. The thin free-hand section was made with specimen hardened in alcohol using a surgical blade in order to observe the structure of the skeleton. Spicules were prepared by dissolving a piece of sponge in sodium hypochlorite and examined with scanning electron microscope (HITACHI S-3000N). For SEM analysis of spicules, the procedure of Rützler (1978) was followed. The type specimens are deposited in the Natural History Museum (NHM), Hannam University, Daejeon, Korea.

SYSTEMATIC ACCOUNTS

*newly recorded species to the Korean fauna.

**new species to the science.

Phylum Porifera Grant, 1836 해면동물문

Class Demospongia Sollas, 1885 보통해면강
 Subclass Tetractinomorpha Levi, 1956 사촉해면아강
 Order Astrophorida Levi, 1973 별해면목
 Family Ancorinidae Schmidt, 1870 별해면과

1. *Penares incrustans* Tanita, 1963 꺾질닷해면

Material examined. Gaerinyeo, 13 Aug. 1999; Ponjianmal, 24 Jul. 2000; Sinyeo, 25 Jul. 2000; Sokanyeo, 26 Jul. 2000; Kukhuldo, 11 Jul. 2001.

Distribution. Korea (Korea Strait, Yellow Sea), Japan (Noto peninsula).

Order Hadromerida Topsent, 1894 경해면목
 Family Latrunculiidae Topsent, 1922 도독나팔해면과

2. *Latrunculia ikematsui* Tanita, 1968 도독나팔해면

Material examined. Gaerinyeo, 13 Aug. 1999; Kukhuldo, 25 Jul. 2000; 11 Jul. 2001; Sokanyeo, 26 Jul. 2000; 13 Jul. 2001.

Distribution. Korea (Korea Strait, Yellow Sea), Japan.

Family Stylocordylidae Topsent, 1928 침곤봉해면과

****3. *Stylocordyla koreana* n. sp.** 한국침곤봉해면 (신칭) (Fig. 2A-H)

Type specimens. Holotype (Por. 40, NHM, Hannam Univ.), Kukhuldo on 21 July 2001, SCUBA 25 m depth. Five Paratypes (Por. 40-1, Por. 40-2, Por. 40-3, Por. 40-4, Por. 40-5, Dept. of Biology, Hannam Univ.) collected with Holotype.

Description. External form typical for genus *Stylocordyla*, 5–11 cm high; head, 1.3–1.8 cm high and 1 cm wide, and stalk, 0.1 cm in diameter in middle, gradually thicker ending like root. Head, subspherical and slightly flattened with single central oscular, 0.1–0.2 mm in diameter. Surface, velvety and almost smooth. Colour in life pale purple. Texture firm. Skeleton of stalk composed of compacted, vertically disposed long oxeas in axial part. Outside of the stalk covered with bundle of microxea. Skeleton of head arranged radially with bundle of oxeas. In dermal skeleton of head composed heteroxeas and microxeas. Skeleton.

Head: Large oxeas	750–1040 × 10 μm
Heteroxeas	320–800 × 1.5–2.5 μm
Microxeas	40–50 × 2 μm
Stalk: Large oxeas	1400–2200 × 20–30 μm
Small oxeas	225–250 × 5 μm
Dermal microxeas	70–80 × 3 μm

Etymology. The specific name *koreana* is named after Korea.

Remarks. This new species is very similar to *S. borealis* of Koltun (1971) and Bergquist (1972) in spicule category, but *S. koreana* has larger and thicker oxea, heteroxea and microxea than *S. borealis*'s spicules and no centrotylote microxeas and centrotylote stroglyoxea. The colour and habitat is different with other species in this genus. Depth of habitat is usually 25 m, however other species belonging to this genus are found in the deep water, 400–900 m depth in general. This genus and family are newly recorded to the Korean fauna.

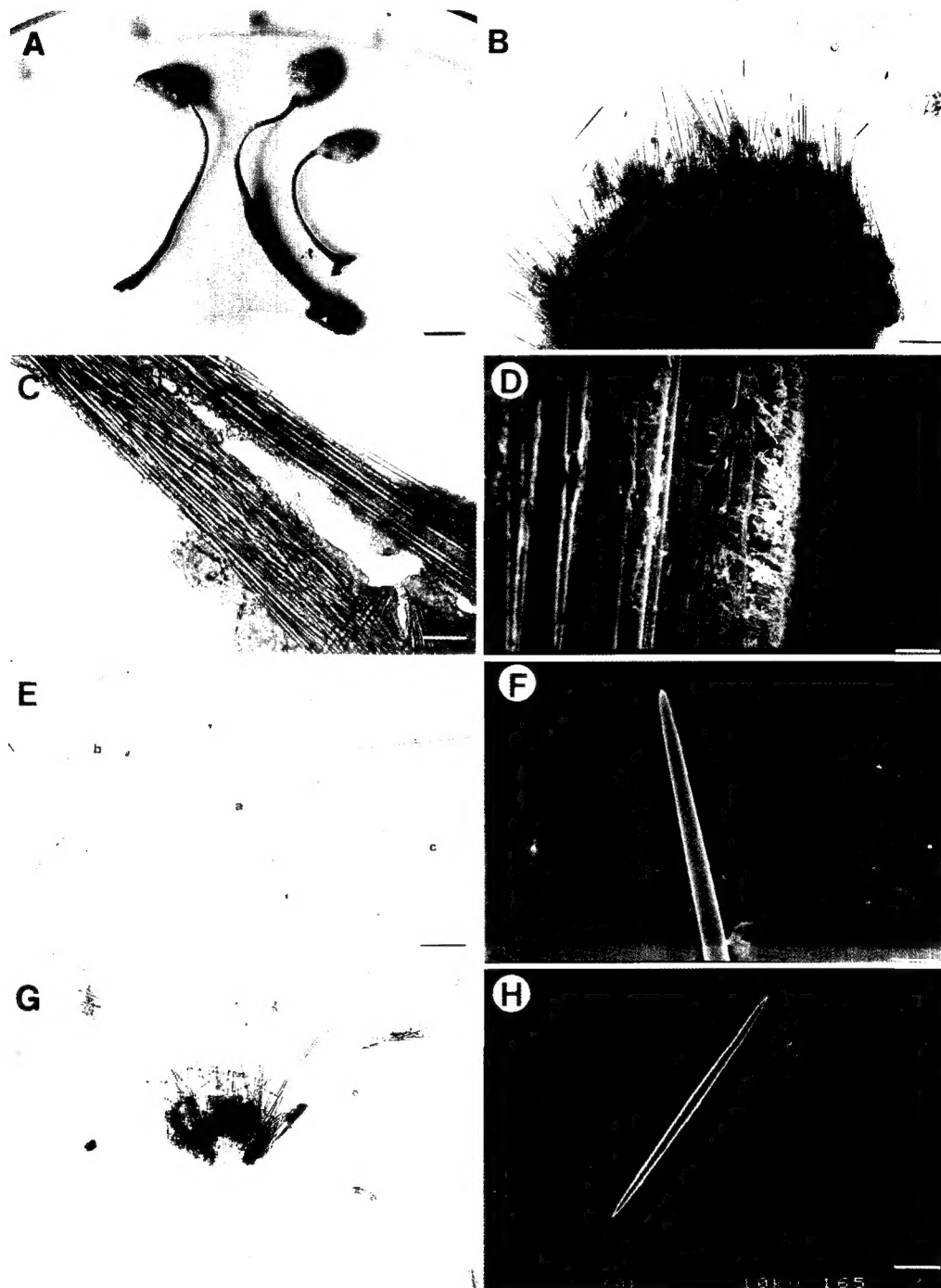


Fig. 2. *Stylocordyla koreana* n. sp. A, specimens in life; B, skeletal structure in surface of head; C, skeletal structure of stalk; D, skeletal structure of stalk (longitudinal section, SEM); E, spicules (a, large oxea; b, middle oxea; c, small oxea); F, the point of middle oxea (SEM); G, bundle of microxea in surface of stalk (SEM); H, microxea (SEM). Scale bars: A, 1 cm; B, 200 μ m; C-D, 100 μ m; E, 300 μ m; G, 50 μ m; H, 10 μ m.

Family Polymastidae Gray, 1867 다공해면과

***4. *Polymastia murrayi* Burton, 1959** 무레이다공해면 (신칭) (Fig. 3A-F)

Polymastia murrayi Burton, 1959, p. 206, text-fig. 8.

Material examined. Kukhuldo, 11 Jul. 2001.

Description. Irregular massive sponges, size up to $5.5 \times 4.5 \times 4$ cm. Texture hard and flexible. Surface smooth and peaky projection scattered. One oscule, 0.2–1 mm in diameter, opened at

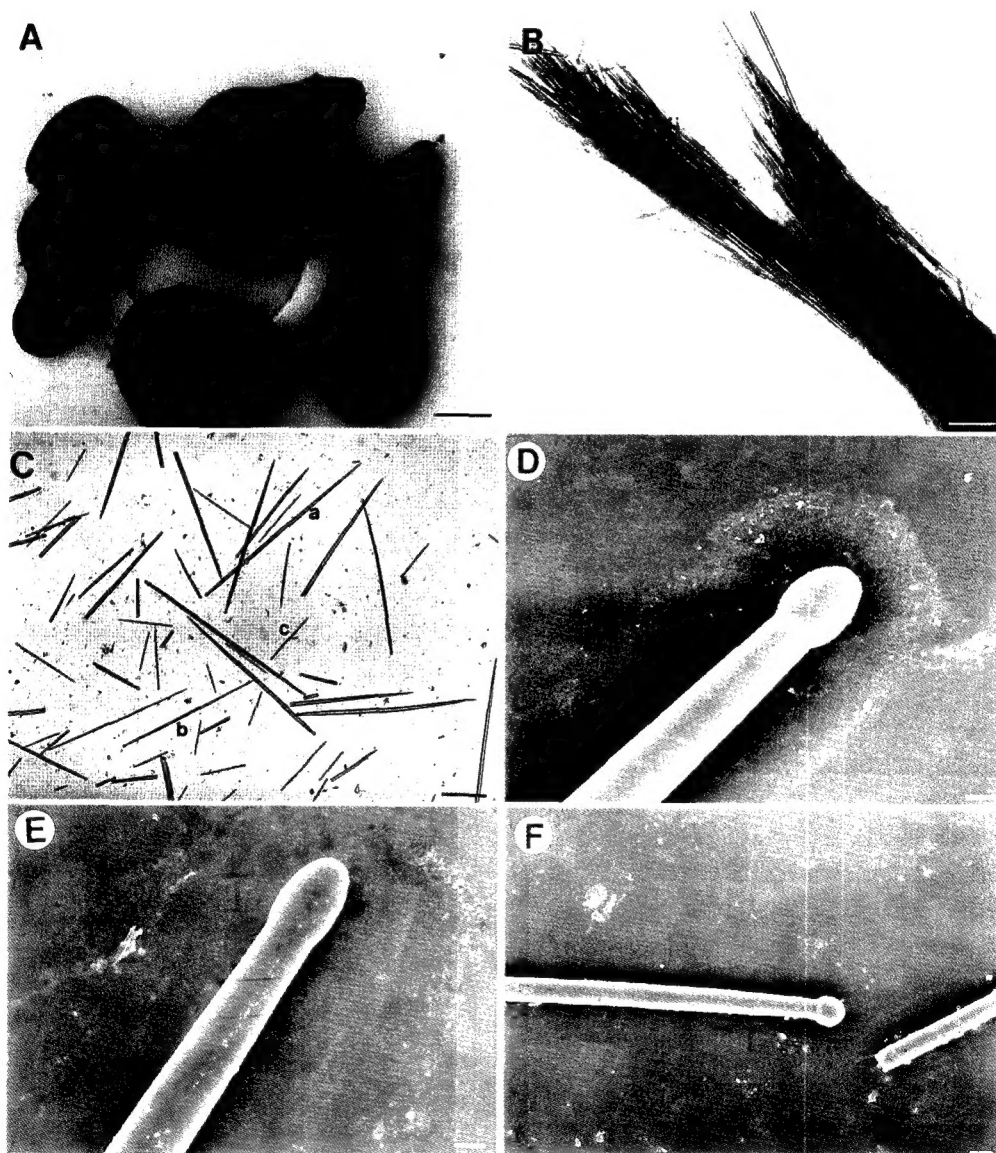


Fig. 3. *Polymastia murrayi* Burton, 1959. A, upper view of specimens in life; B, skeletal structure; C, megascleres (a, large tylostyle; b, medium tylostyle; c, small tylostyle); D, head of large tylostyle; E, head of medium tylostyle; F, head of small tylostyle. Scale Bars: A, 1 cm; B, 200 μm; C, 100 μm; D, 20 μm; E-F, 5 μm.

projection end. Color, reddish orange in life, while, greenish ivory preserved in alcohol.

Ectosomal skeleton: Middle and small tylostyles arranged densely parallel.

Endosomal skeleton: Large tylostyle arranged as whole endosome densely parallel.

Spicules.

Large tylostyles 830–1600 × 14–27 μm

Middle tylostyles 430–680 × 10–12 μm

Small tylostyles 140–370 × 4–8 μm

Remarks. The small tylostyle in our specimen is larger than Burton's one (1959). However growth form, shape and composition of spicules are very similar to the specimen of Burton (1959).

Distribution. Korea (Yellow Sea), Maldive area, Gulf of Aden.

Family Suberitidae Schmidt, 1870 코르크해면과

5. *Suberites japonicus* Thiele, 1898 왜코르크해면

Material examined. Gaerinyeo, 13 Aug. 1999; Ponjianmal, 24 Jul. 2000; Sinyeo, 25 Jul. 2000; Kukhuldo, 11 Jul. 2001; Sokanyeo, 11 Jul. 2001.

Distribution. Korea (Korea Strait, Yellow Sea), Japan (Seto Island).

6. *Suberites mammilaris* Sim and Kim, 1994 유두코르크해면

Material examined. Tuogyeo, 15 Aug. 1999; Kommunyeo, 26 Jul. 2000.

Distribution. Korea (Jejudo).

7. *Suberites excellens* Thiele, 1898 코르크해면

Material examined. Gaerinyeo, 13 Aug. 1999.

Distribution. Korea (Korea Strait, Yellow Sea), Japan (Sagami Bay).

Family Tethyidae Gray, 1867 딸기해면과

8. *Tethya simi* Sara, 2000 심둥글해면 (Fig. 4A-D)

Material examined. Gaerinyeo, 19 Aug. 1999; 26 Jul. 2000.

Distribution. Korea (Korea Strait, Yellow Sea), Japan (Amani-Ohshima, Kurushima Strait).

Subclass Ceractinomorpha Levi, 1953 일축해면아강

Order Poecilosclerida Topsent, 1928 다골해면목

Suborder Microcionia Hajdu, van Soest and Hooper, 1933 유령해면아목

Family Microcionidae Carter, 1875 유령해면과

9. *Antho (Dirrhopalim) brathesaridi* Soest, 1986 나무꽃해면

Material examined. Kukhuldo, 11 Jul. 2001; Sokanyeo, 13 Jul. 2001.

Distribution. Korea (Jejudo, Yellow Sea).

10. *Antho (Placomia) bakusi* Sim and Lee, 1998 바쿠시꽃해면

Material examined. Gaerinyeo, 13 Aug. 1999.

Distribution. Korea (Korea Strait, Yellow Sea).

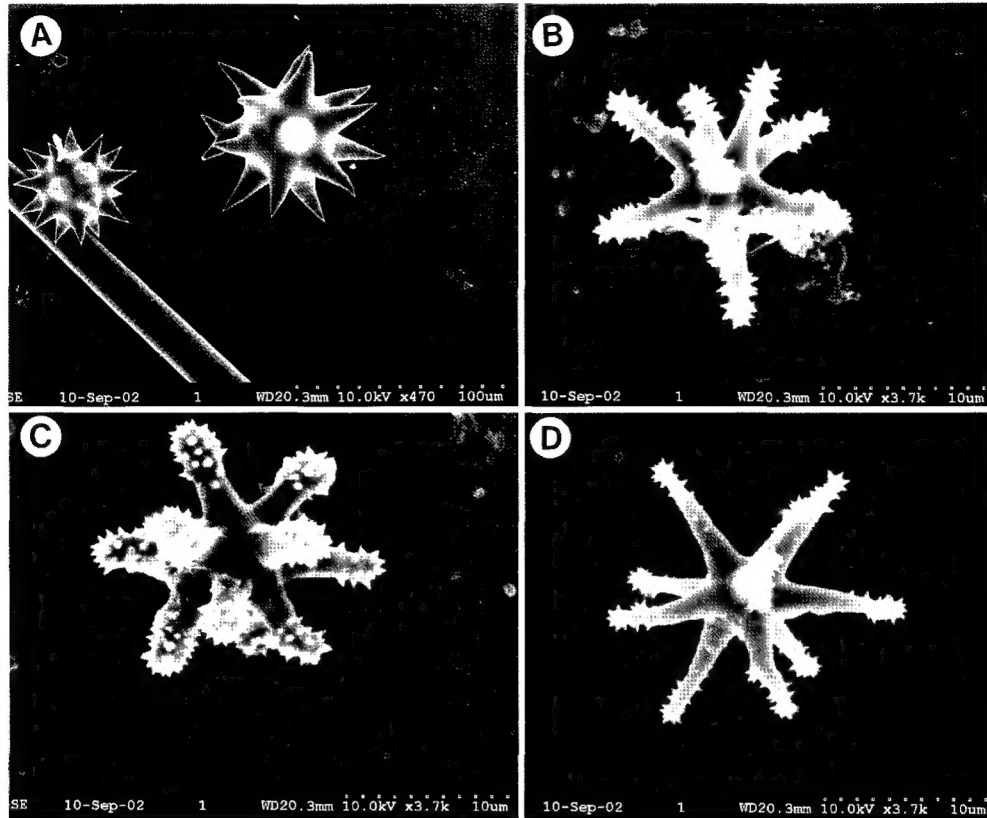


Fig. 4. Microscelres of *Tethya simi* Sara *et al.*, 2000 (SEM). A, megasters; B, tylaster; C, tylaster; D, oxyaster. Scale bars: A, 100 μ m; B-D, 10 μ m.

11. *Clathria (Axociella) simae* Hooper, 1996 동근축털해면

Material examined. Tuogyeo, 15 Aug. 1999; Ponjianmal, 24 Jul. 2000; Kommunyeo, 25 Jul. 2000; Sinyeo, 25 Jul. 2000; Sokanyeo, 26 Jul. 2000; 13 Jul. 2001; Kukhuldo, 11 Jul. 2001.

Distribution. Korea (Korea Strait, Jeju, Yellow Sea), Port Jackson.

*12. *Clathria (Thalysias) spicata* Gray, 1924 어두운유령해면 (신칭)

(Fig. 5A-F, Fig. 6A-D)

Clathria spicata: Dendy, 1921, pl.5, fig. 2; pl. 13, fig. 4a-f.

Material examined. Gaerinyeo, 13 Aug. 1999; Ponjianmal, 24 Jul. 2000; Sinyeo, 25 Jul. 2000; Kukhuldo, 11 Jul. 2001.

Description. Sponge erect, branched from single trunk. Size up to 20.5 cm in high and 8.2 cm in wide and branches about 0.9-1.5 cm in diameter. Oscules up to 0.3-1.2 mm in diameter, scattered on surface. Texture tough. Color orange in life, pale ivory in spirits.

Spicules.

Megascleres: Large styles 250-390 \times 17-28 μ m

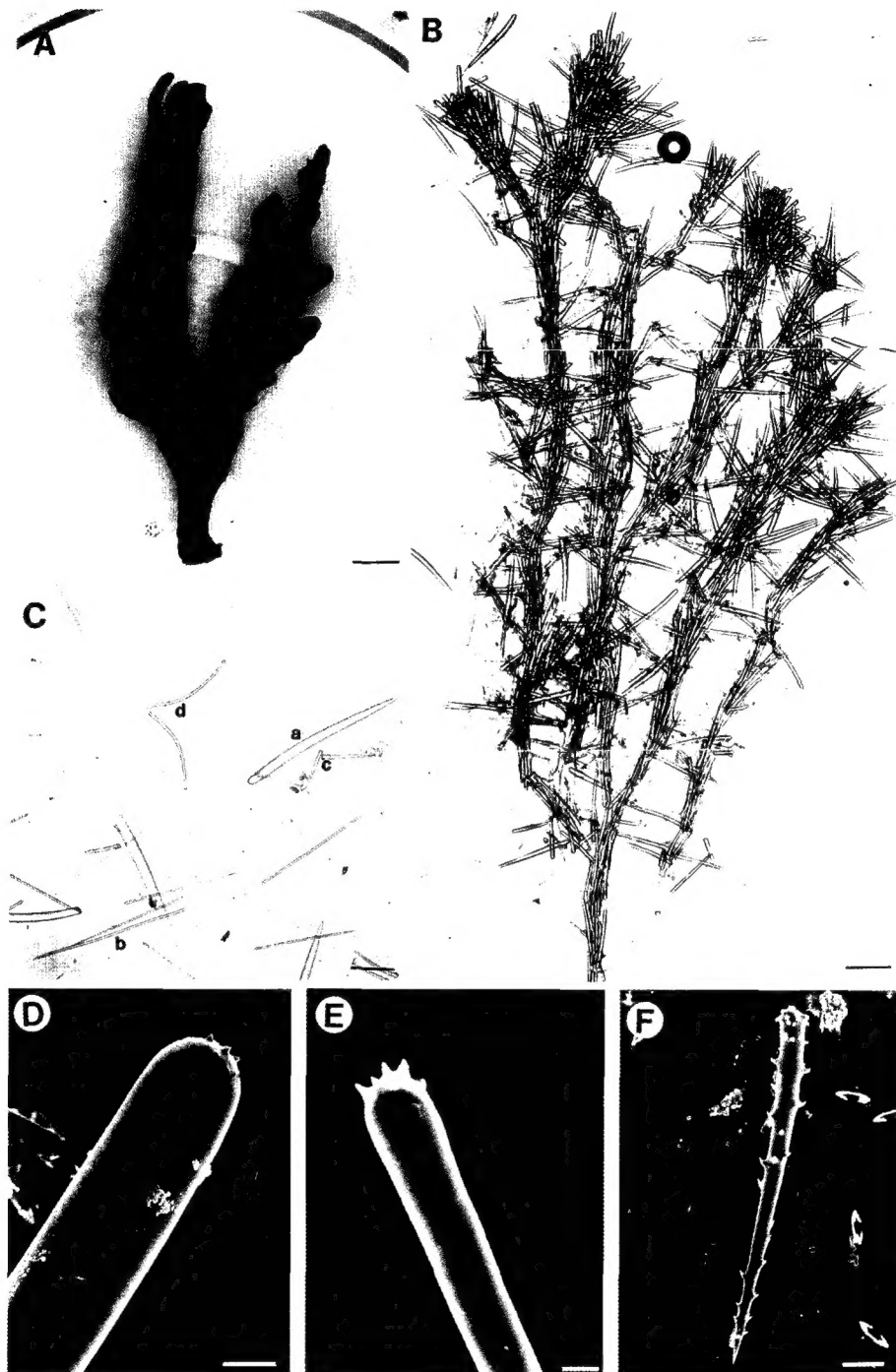


Fig. 5. *Clathria (Thalysias) spicata* Gray, 1924. A, side view of specimen in life; B, skeletal structure of endosome and ectosome; C, spicules (a, large style; b, slender style; c, acanthostyle; d, large toxa); D, spined head of large style (SEM); E, spined head of slender style (SEM); F, acanthostyle (SEM). Scale Bars: A, 1 cm; B, 150 μm; C, 100 μm; D, 15 μm; E, 5 μm; F, 10 μm.

Small styles	155–280 × 2–5 μm
Acanthostyles	90–115 × 8–10 μm
Microscleres : Large toxas	150–200 μm
Small Toxas	55–60 μm
Isochelas	7.5–12.5 μm

Remark. Toxa of our specimen is smaller than Dendy (1921)' one.

Distribution. Korea (Yellow Sea), West Australia.

Family Raspailidae Hentschel, 1923 털해면과

13. *Raspailia hirsuta* Thiele, 1898 털많은가지해면

Material examined. Ponjianmal, 24 Jul. 2000.

Distribution. Korea (Korea Strait, Jejudo), Japan (Sagami Bay).

14. *Ceratopsion clavata* Thiele, 1898 곤봉뿔해면

Material examined. Kaerinyeo, 26 Jul. 2000.

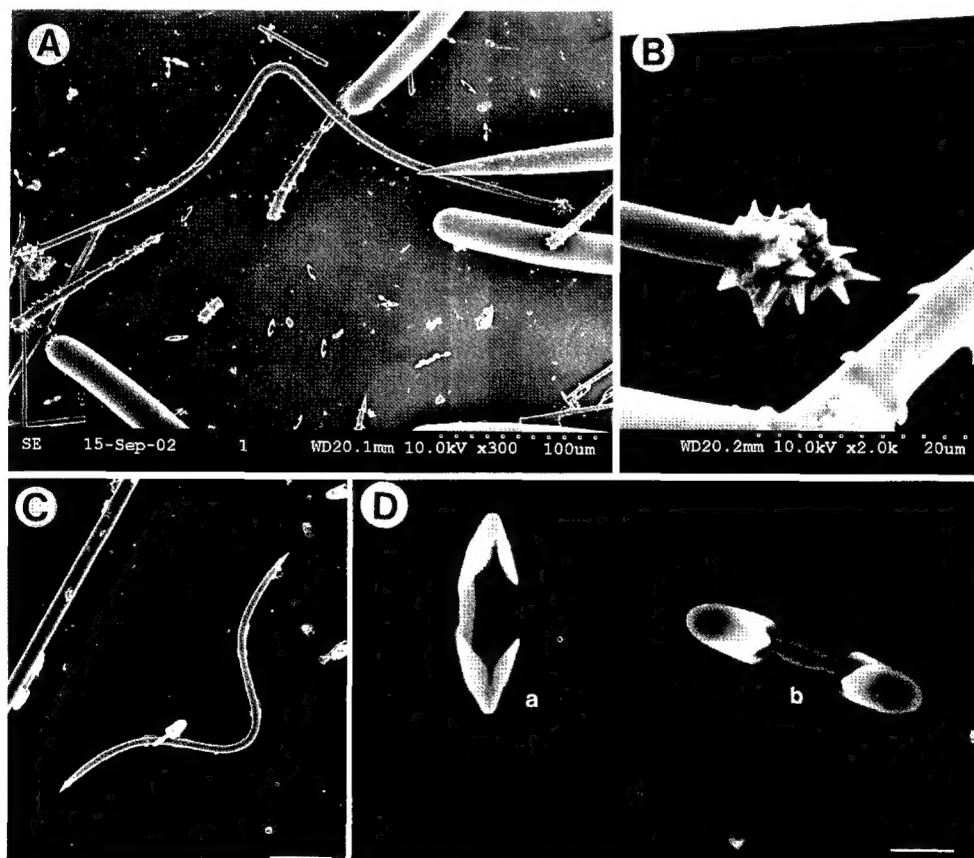


Fig. 6. *Clathria* (*Thalysias*) *spicata* Gray, 1924. A, large toxa; B, spined end of large toxa; C, small toxa; D, Isochela (a, side view; b, front of isochela). Scale Bars: A, 100 μm; B, 20 μm; C, 10 μm; D, 5 μm.

Distribution. Korea (Jejudo, Yellow Sea), Japan.

Suborder Myxillina Hajdu, van Soest and Hooper, 1933 끈적해면아목

Family Coelosphaeridae Hentschel, 1923 강해면과

15. *Forcepia japonica* Koltun, 1959 왜핀셋해면

Material examined. Sinyeo, 25 Jul. 2000; Sokanyeo, 26 Jul. 2000.

Distribution. Korea (Jejudo, Yellow Sea), Japan.

16. *Lissodendoryx firma* (Lambe, 1895) 뇌산호끈적해면

Material examined. Tuogyeo, 15 Aug. 1999; Gaerinyeo, 26 Jul. 2000.

Distribution. Korea (Jejudo, Yellow Sea), California, San Juan Archipelago, Washington, West Canada.

17. *Lissodendoryx isodictyalis* (Carter, 1882) 두드럭끈적해면

Material examined. Tuogyeo, 15 Aug. 1999.

Distribution. Korea (Korea Strait, Yellow Sea), North America, Caribbean Sea.

Family Myxillidae Topsent, 1928 끈적해면과

18. *Myxilla productus* Hoshino, 1981 긴끈해면

Material examined. Gaerinyeo, 13 Aug. 1999; Ponjianmal, 24 Jul. 2000.

Distribution. Korea (Korea Strait, Yellow Sea), Japan.

19. *Myxilla rosacea* (Lieberkühn, 1859) 장미끈적해면

Material examined. Ponjianmal, 24 Jul. 2000.

Distribution. Korea (South Sea), Japan.

20. *Myxilla setoensis* Tanita, 1961 넓적끈적해면

Material examined. Ponjianmal, 25 Jul. 2000; Sinyeo, 25 Jul. 2000; Kukhuldo, 11 Jul. 2001; Sokanyeo, 13 Jul. 2001.

Distribution. Korea (Korea Strait, Yellow Sea), North America, Japan.

21. *Myxilla incrustans* (Johnston, 1842) 껍질끈적해면

Material examined. Gaerinyeo, 13 Aug. 1999; Sokanyeo, 13 Jul. 2001.

Distribution. Korea (Yellow Sea), Canada (Pacific coast), Japan.

Family Tedaniidae Ridley and Dendy, 1886 테다니해면과

22. *Tedania rhoi* Sim and Lee, 1998 로이테다니해면

Material examined. Kukhuldo, 11 Jul. 2001.

Distribution. Korea (Korea Strait, Yellow Sea).

Family Mycalidae Lundbeck, 1905 갯해면과

23. *Esperiopsis uncigera* Topsent, 1928 관발톱해면

Material examined. Tuogyeo, 15 Aug. 1999; Kukhuldo, 25 Jul. 2000; 11 Jul. 2001; Sinyeo,

25 Jul. 2000; Sokanyeo, 26 Jul. 2000.

Distribution. Korea (East Sea, Korea Strait, Yellow Sea), Japan (Sagami Bay).

24. *Mycale (Aegogropila) hentscheli* Sim and Lee, 2001 헨첼리깃해면

Material examined. Gaerinyeo, 13 Aug. 1999; Sinyeo, 25 Jul. 2000.

Distribution. Korea (Yellow Sea).

25. *Mycale adhearens* (Lambe, 1893) 깃해면

Material examined. Tuogyeo, 15 Aug. 1999; Sinyeo, 13 Jul. 2001.

Distribution. Korea (Yellow Sea), Canada (Pacific coast), Japan.

26. *Mycale adhearens nullarotte* Hoshino, 1981 유착깃해면

Material examined. Kukkuldo, 11 Jul. 2001.

Distribution. Korea (Korea Strait, Yellow Sea), Japan.

27. *Oxymycale rhoi* Sim and Lee, 1998 로이간상바늘뼈해면

Material examined. Tuogyeo, 15 Aug. 1999; Sinyeo, 25 Jul. 2000; Sinyeo, 26 Jul. 2000; Kukhuldo, 25 Jul. 2000; 11 Jul. 2001.

Distribution. Korea (Korea Strait, Yellow Sea).

Order Halichondrida Vosmaer, 1885 해변해면목

Familiy Axinellidae Carter, 1875 축해면과

28. *Axinella corpiosa* Thiele, 1898 축해면

Material examined. Sinyeo, 25 Jul. 2000; Kukhuldo, 11 Jul. 2001.

Distribution. Korea (Yellow Sea, Jeju), Japan.

29. *Homaxinella arbora* Sim et al., 1990 나무둥근축해면

Material examined. Kommunyeo, 26 Jul. 2000.

Distribution. Korea (Jeju, Yellow Sea).

30. *Phakellia elegans* Thiele, 1898 맵시해면

Material examined. Gaerinyeo, 13 Aug 1999; Ponjianmal, 24 Jul. 2000; Sinyeo, 25 Jul. 2000; Kukhuldo, 11 Jul. 2001.

Distribution. Korea (Korea Strait, Jeju, Yellow Sea), Japan (Sagami Bay).

Order Haplosclerida Levi, 1953 단골해면목

Family Chalinidae Gray, 1867 보라해면과

31. *Haliclona densaspicula* Hoshino, 1981 뾰뾰침보라해면

Material examined. Tuogyeo, 15 Aug. 1999; Sokanyeo, 26 Jul. 2000; Kukhuldo, 11 Jul. 2001.

Distribution. Korea (South Sea, Mipo, Yellow Sea), Japan.

Family Callyspongiidae De Laubenfels, 1936 예쁜이해면과

32. *Callyspongia elongata* (Ridley & Dendy, 1886) 길쭉예쁜이해면**Material examined.** Tuogyeo, 15 Aug. 1999.**Distribution.** Korea (Korea Strait, Yellow Sea), Japan.**33. *Callyspongia variabilis* (Dendy, 1890) 번덕예쁜이해면****Material examined.** Kukhuldo, 11 Jul. 2001.**Distribution.** Korea (Jejudo, Yellow Sea), Japan (Takeno Island), Bahama.

Order Dictyoceratida Minchin, 1900 망각해면목

Family Irciniidae Gray, 1867 가는실해면과

34. *Psammocinia bergquisti* Sim and Lee, 2001 버키스트모래해면**Material examined.** Sokanyeo, 15 Aug. 1999.**Distribution.** Korea (Yellow Sea).**35. *Psammocinia gageoensis* Sim and Lee, 2001 가거모래해면****Material examined.** Sinyeo, 25 Jul. 2000.**Distribution.** Korea (Yellow Sea).**ACKNOWLEDGEMENTS**

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REFERENCES

- Bergquist, P. R., 1972. Deep water demospongiae from New Zealand. *Micronesica.*, **8**(1-2): 125-135.
- Burton, M., 1959. Sponges. *Scientific Reports*, **X**(5): 206-207.
- Dendy, A., 1921. No. I.-Report on the Sigmatoteraxonida collected by H. M. S. "Sealark" in the Indian Ocean. *Trans. Linn. Soc. London*, **18**(2): 65-66.
- Kotun, V. M., 1971. Four rayed sponges of the northern and far eastern seas of the USSR (Otriad Tetraxonida). *Fish. Res. Board Can.*, **1785**: 107-140.
- Rützler, K., 1978. Sponges in coral reefs. *In*: Stoddart D. R. and Johannes R. E. (eds), *Coral Reef: Research Methods. Monogr. Neth. Unesco*, **5**: 299-313.
- Sim, C. J. and K. J. Lee, 2001a. Two new species of the genus *Mycale* (Poecilosclerida, Mycalidae) from Korea. *Korean J. Biol. Sci.*, **5**: 25-29.
- Sim, C. J. and K. J. Lee, 2001b. Two new species of the genus *Psammocinia* (Dictyoceratida, Irciniidae) from Korea. *Korean J. Syst. Zool.*, **17**(2): 245-250.
- Sim, C. J. and K. J. Lee, 2002. Two new psammocinian sponges (Dictyoceratida, Irciniidae) from Korea. *Korean J. Biol. Sci.*, **6**(1): 53-57.

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가거도 해산 해면류의 분류학적 연구

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요 약

가거도 해산 해면류를 동정·분류하기 위해 1999년 8월부터 2001년 7월까지 가거도 인근 지역섬으로부터 채집한 표본을 동정하였다. 그 결과 1강 2아강 6목 16과 23속 35종으로 밝혀졌고, 이 중 무레이다공해면 (*Polymastia murrayi* Burton, 1959)과 어두운유령해면 (*Clathria (Thalysias) spicata* Gray, 1924)의 2종이 한국미기록종으로 밝혀졌으며 한국침곤봉해면 (*Stylocordyla koreana* n. sp.)이 신종으로 밝혀졌다.